

IAP20 Res'J PCT/PCT 06 JAN 2006

CONSTRUCTION OF A TUBULAR AT A DOWNHOLE LOCATION

Background of Invention**Field of the Invention**

[0001] The invention relates generally to a downhole construction process in a borehole.

Background Art

[0002] Lateral hole drilling is increasingly being used in well constructions. The lateral hole allows to access a zone of a reservoir at a lateral distance from the well, e.g. an hydrocarbon reservoir, or an aquifer. Lateral hole drilling is proven to be useful in the case of high hydrocarbon viscosity, low permeability formation, highly layered reservoir etc.

[0003] FIG. 1 illustrates a schematic of a lateral hole 11 departing from a main well 12. The drilling of the lateral hole 11 is often performed with a flexible motor (not represented in FIG. 1).

[0004] When drilling the main well 12, a casing 13 is installed in order to isolate geological layers (14, 15) from each other, or to isolate a geological layer 15 from a first reservoir 16 in order to prevent the content of the first reservoir 16 to leak along the well. The casing 13 also allows to stabilize and to avoid a collapsing of the main well. The casing 13 is installed by pushing into the borehole large pieces (not represented) of tubular one after the other. An annulus behind the casing 13 is cemented so as to isolate the layers (14, 15) from the reservoir 16.

[0005] Similarly, the lateral hole 11 may also be cased, especially in the event that the lateral hole 11 allows an access to a second reservoir 19 distinct from the first reservoir 16. Since it is not possible to push large pieces of tubular in an extreme sharp curve, right-angle constructing of a cased lateral hole is difficult to achieve.

[0006] Once the main well 12 is cased, a first screen 17 may be installed close to the reservoir 16, thus allowing a communication between the reservoir 16 and the main well 12. Alternatively, the cemented casing may be perforated.

[0007] Similarly, these operations may need to be performed at the lateral hole 11. Installing a second screen 18 in the lateral hole 11 and cementing a lateral annulus of the lateral hole 11 may be rendered almost impossible in a perpendicular lateral hole. For these reasons, the lateral hole 11 is drilled from the main well 12 following a radius curve that departs tangentially from the main well 12 to reach an horizontal direction.

[0008] In case the lateral hole is intended to reach a relatively thin reservoir, it is difficult to control the radius curve so as to position the lateral hole in the relatively thin reservoir.

[0009] Short radius drilling methods allows to obtain a radius curve with a relatively short radius. This is achieved by involving a drill string that has a flexible lower part, as described in the International publication WO 02/086278.

[0010] The International publication WO 99/29997 describes a flexible shaft formed of a coil spring. The US patent 5,699,866 describes a system in which the lower part of the drill string is constituted of articulated driving segments. The lower part of the drill string is thus rendered flexible. The two latter methods allow drilling a lateral hole in a substantially perpendicular direction, which renders the orientation of the lateral hole and the access to the thin reservoir easier, but no completion step for the lateral hole is described nor suggested.

[0011] It has also to be observed that in typical casing drilling techniques for drilling a vertical hole, the tubular is used as a drill-shaft. The tubular is used during the drilling of the well and subsequently it is cemented in place as a conventional casing.

[0012] Using a more recent technique for well construction, the tubular may be expanded to insure a larger bore inside the well. This technique is known as SET (Solid Expandable Tubular). The expanding requires high energy as typically the tubular is deformed circumferentially in plasticity. Today, casing drilling process using the tubular as a drill string has not yet been combined with a SET application. It is recognized that a combination of lateral hole construction, casing drilling and/or tubular expansion is a major challenge.

Summary of Invention

[0013] In a first aspect, the invention provides a method for constructing a lateral hole departing from a main well at a determined depth, the lateral hole having a direction of elongation forming a determined angle with the main well. The method comprises positioning a drilling machine at the determined depth in the main well, drilling the lateral hole departing from a wall of the main well, in substantially the direction of elongation forming the determined angle with the main well, using the drilling machine, constructing a tubular for the lateral hole at a downhole location, and positioning the constructed tubular into the lateral hole.

[0014] In a first preferred embodiment, the inventive method further comprises positioning the constructed tubular into the lateral hole during the drilling and connecting a drill bit at an end of the constructed tubular. The constructed tubular is used as a drill string to drill the lateral hole.

[0015] In a second preferred embodiment, the direction of elongation is substantially perpendicular to a longitudinal direction of the main well.

[0016] In a third preferred embodiment, the method further comprises constructing the tubular at the downhole location from a band of metal; the band of metal is unwrapped from a storage roll and wrapped following a spiral to obtain the tubular.

[0017] In a fourth preferred embodiment the storage roll is stored at the downhole location in the drilling machine.

[0018] In a fifth preferred embodiment the storage roll is stored at a surface location.

[0019] In a sixth preferred embodiment the tubular is constructed at the downhole location from a reserve of material, the reserve of material having a size adapted to be stored in the drilling machine.

[0020] In a seventh preferred embodiment the reserve of material contains at least a rolled band of metal, and the constructing of the tubular is performed by wrapping the band of metal following a spiral.

[0021] In an eight preferred embodiment, the method further comprises jointing the wrapped band of metal.

[0022] In a ninth preferred embodiment, the jointing is performed by spot welding.

[0023] In a tenth preferred embodiment, the jointing is performed by permanent plastic lip pressing.

[0024] In an eleventh preferred embodiment, the method further comprises constructing a strippable slotted liner along a zone of communication with a reservoir, and pumping a cement fluid behind the tubular along a determined portion of the tubular, the determined portion of the tubular being distinct from the zone of communication with the reservoir.

[0025] In a twelfth preferred embodiment, the strippable slotted liner is constructed from a slotted band of metal, the slotted band of metal comprises a slotted layer and a thin layer, the thin layer covering the slotted layer, and the forming of the strippable slotted layer is performed by peeling off the thin layer.

[0026] In a thirteenth preferred embodiment, the peeling is performed by pulling on a cable attached to an end of the thin layer.

[0027] In a fourteenth preferred embodiment, the method further comprises applying a left-hand torque onto the wrapped band of metal in order to expand the tubular.

[0028] In a fifteenth preferred embodiment, the reserve of material comprises a plurality of short pipes and the method further comprises jointing the short pipes together to obtain the tubular.

[0029] In a sixteenth preferred embodiment the jointing of the short pipes is performed by screwing the short pipes to each other by threads.

[0030] In a second aspect the invention provides a drilling machine for constructing a lateral hole departing from a main well at a determined depth, the lateral hole having a direction of elongation forming a determined angle with the main well. The drilling machine comprises drilling means to drill the lateral hole, departing at the determined depth from a wall of the main well, in substantially the direction of elongation forming the determined angle with the main well. The drilling machine further comprises constructing means to construct a tubular for the lateral hole at a downhole location, and positioning means to position the constructed tubular in the lateral hole.

[0031] In a seventeenth preferred embodiment, the drilling machine further comprises a drill bit at an end of the constructed tubular to drill the lateral hole.

[0032] In an eighteenth preferred embodiment the drilling machine further comprises a reserve of material from which the tubular is constructed.

[0033] In a nineteenth preferred embodiment the reserve of material is stored inside the drilling machine, and the reserve of material comprises an active rolled band of metal, the active rolled band of metal being oriented in a direction substantially perpendicular to the direction of elongation. Furthermore the drilling machine comprises a short shaft between the active rolled band of metal and the constructed tubular.

[0034] In a twentieth preferred embodiment the drilling machine further comprises a motor to generate a rotation, a transmission shaft to transmit the rotation to the drill bit, a pushing system to generate an axial force, and a lever system to transmit the axial force to the drill bit.

[0035] In a twenty-first preferred embodiment the reserve of material is stored in the drilling machine. The reserve of material comprises an active rolled band of metal, the active rolled band of metal being oriented in a direction substantially perpendicular to a longitudinal direction of the main well. The drilling machine further comprises a motor to generate a rotation force, a pushing system to generate an axial force, and a short shaft that is bended between the active rolled band of metal and the constructed tubular, the short shaft transmitting the rotation force and the axial force to the drill bit. The drilling machine further comprises a guidance system to guide the short shaft.

[0036] In a twenty-second preferred embodiment, the drilling machine further comprises wrapping means to wrap the band of metal following a spiral, and a jointing device to joint the wrapped band of metal.

[0037] In a third aspect, the invention provides a system for constructing a lateral hole departing from a main well at a determined depth, the lateral hole having a direction of elongation forming a determined angle with the main well. The system comprises a drilling machine according to the invention, and positioning means to position the drilling machine at the determined depth.

[0038] In a twenty-third preferred embodiment, the system further comprises a strippable slotted liner in the lateral hole, the strippable slotted liner allowing a communication between the lateral hole and a reservoir along a zone of communication with the reservoir, and pumping means to pump a cement fluid behind the tubular along a determined portion of the tubular, the determined portion of the tubular being distinct from the zone of communication with the reservoir.

[0039] In a twenty-fourth preferred embodiment; the reserve of material comprises a plurality of short pipes.

[0040] Other aspects and advantages of the invention will be apparent from the following description and the appended claims.

Brief Description of Drawings

[0041] Figure 1 illustrates a schematic of an horizontal well from prior art;

[0042] Figure 2 is a flowchart illustrating an example embodiment of the present invention;

[0043] Figure 3 illustrates a first example embodiment of the present invention at a drilling step;

[0044] Figure 4 illustrates a band of metal according to an embodiment of the present invention;

[0045] Figure 5 illustrates a band of metal according to another embodiment of the present invention;

[0046] Figure 6 illustrates a first example embodiment of the present invention at a completion step;

[0047] Figure 7 illustrates a slotted band of metal according to an embodiment of the present invention;

[0048] Figure 8 illustrates a tubular during an expanding step according to an embodiment of the present invention;

[0049] Figure 9 illustrates a second example embodiment of the present invention;

[0050] Figure 10 illustrates a third example embodiment of the present invention.

Detailed Description

[0051] In a horizontal well, a lateral hole to be cased is generally drilled following a short radius curve. However, it is difficult to precisely control an orientation of the short radius curve; as a consequence, the lateral hole may fail to reach the reservoir, especially in a case of a relatively thin layered reservoir.

[0052] The lateral hole intersects with the main well in a casing window. The casing window has a shape of a long ellipse, which causes the stability and the strength of the main hole to be reduced, even if the casing window is cased. The opening of the casing window is difficult to achieve and a fair amount of metal fillings and cuttings is generated with the risk of damage to critical components in or around the well.

[0053] The invention allows to construct a lateral hole in a direction substantially perpendicular to a longitudinal direction of the main well.

[0054] FIG. 2 provides a simplified flowchart of an example method for constructing a lateral hole departing from a main well, the lateral hole having a direction of elongation forming a determined angle with the main well. The example method allows the lateral hole to depart substantially perpendicularly to a longitudinal direction of the main well. A drilling machine is provided and positioned in box 21 at a determined depth of a main well. The lateral hole is drilled in box 22 using the drilling machine. The drilling is performed in the direction of elongation that forms the determined angle with the main well. The determined angle may for example be 90°. A tubular is constructed at a downhole location in box 23. The constructed tubular is positioned into the lateral hole in box 24.

[0055] The lateral hole may be drilled in a direction substantially perpendicular to a longitudinal direction of the main well, because the tubular is built in-situ.

[0056] The invention achieves a number of advantages over prior art as will be described in more detail in the following paragraphs.

[0057] As the direction of elongation of the lateral hole is adjusted precisely, it is possible to insure that the lateral hole reaches and remains in an intended hydrocarbon layer over a full length of the lateral hole.

[0058] The possibility of right angle positioning of the lateral hole relative to the main well eliminates the risk inherent to short radius drilling known from prior art, i.e., the risk of having the lateral hole emerge in a wrong layer of a formation surrounding the main well. If the wrong layer contains water, this may cause a major geological disorder. The prior art short radius drilling implies a short radius when drilling that is difficult to plan and orientate precisely.

[0059] A planning for the lateral drilling is made easier as in prior art since the lateral drilling may be performed directly at the depth of a zone of interest.

[0060] The lateral hole according to the invention is generally shorter than a short radius lateral hole from prior art when having to reach a determined location. As a consequence there may be less friction loss during production of oil, and more flow of oil may be allowed for a given diameter of the lateral hole.

[0061] If the lateral hole has a direction of elongation substantially perpendicular to a longitudinal direction of the main well, a connection between the lateral hole and the main well is generally more stable than a connection obtained with prior art drilling practice. In prior art, a lateral hole intersects the main well over a long ellipse, due to the curved approach of the lateral hole. Hence the wall of the main well appears to have a long axial cut which may be vulnerable to circumferential stress, and may lead to a collapse of the lateral hole, e.g., due to pressure effect. The intersect obtained with the inventive lateral hole is substantially circular and therefore offers an improved resistance to circumferential stress.

[0062] In an embodiment where the main well comprises a casing, the inventive radial drilling allows to remove a lesser part of the casing than in prior art

drilling due to the circular intersect rather than the elliptic intersect. As a consequence a lesser quantity of metal needs to be machined downhole, resulting in a shorter time for drilling and in a reduced risk of leaving metal filings in the well. As explained above, the metal filings may cause well component damaging.

[0063] First example embodiment of the invention

[0064] FIG. 3 contains an illustration of a first example embodiment of the present invention. A drilling machine 301 is positioned in a main well 302 using a main cable 304. When the drilling machine 301 is at a proper depth in the main well 302, the drilling machine 301 is oriented in a proper azimuthal position.

[0065] Once the drilling machine 301 is at the proper depth with the proper azimuthal position, the drilling of the lateral hole 303 starts. If the main cable 304 is not rigid enough to keep the azimuthal position during the full operation, it may be needed to clamp the drilling machine 301 in the main well 302.

[0066] The drilling is performed using a drill bit 307 located at an end of a drill string 305a.

[0067] The drilling is performed in a direction of elongation forming a determined angle with the main well 302. In this embodiment, the direction of elongation is substantially perpendicular to a longitudinal direction of the main well 302. Hence the lateral hole 303 intersects with the main well 302 in a circular window. If the main well 302 has a casing (not represented), a first step may be to drill the circular window in the casing and the cement behind the casing. This could be performed by using a dedicated drilling head (not represented).

[0068] Drilling the lateral hole 303 requires a combination of a rotation force and of an axial force. The drill bit 307 has to be rotated to insure a cutting action, e.g. shearing, gouging or abrasion. When the axial force is applied

onto the drill string, the drill bit 307 is pushed in contact with a formation 308.

[0069] The rotation force and the axial force are generated inside the drilling machine 301. A motor 309 and a transmission shaft 310 rotate the drill string 305a. The axial force is transmitted from a pushing system 311 to the drill string 305a via a lever system 312. A short shaft 313 terminates the drill string 305a inside the drilling machine 301. The short shaft 313 is hollow and may be sealed to the drill string 305a, so as to allow a flow through the short shaft 313 and through the drill string 305a. Typically, a fluid contained in the main well 302 serves as a circulated fluid for the drilling of the lateral hole 303. The flow of such a drilling fluid may be generated by a pump (not represented on FIG. 3). The pump may for example be part of the drilling machine 301.

[0070] A tubular 305 is constructed at a downhole location, e.g. in the drilled lateral hole 303, by unwrapping a band of metal from a storage roll (316, 306). An active rolled band of metal 306 may be oriented in a direction substantially perpendicular to the direction of elongation. One or more storage rolls 316 may also be stored at the downhole location in the drilling machine 301. The active rolled band of metal 306 contains a band of metal 314, e.g., steel or aluminum. However, a synthetic material may also be used.

[0071] Since the lateral hole 303 departs perpendicularly from the main well 302, a long component such as a conventional slim drilling motor, may not enter in the lateral hole 303. The tubular 305 is constructed by wrapping the band of metal 314 following a spiral, thus allowing a right angle direction of the lateral hole 303.

[0072] Similarly, a long drill string may not enter in the lateral hole 303. The constructed tubular 305 is positioned into the lateral hole 303 during the drilling and is then used as the drill string 305a. The drill bit 307 is hence connected to an end of the constructed tubular. The drilling of the lateral hole

303 and the constructing of the tubular 305 are thus performed in a single operation.

[0073] The drilling of the lateral hole 303 and the constructing of the tubular 305 may be performed synchronously. The wrapping is performed continuously while the tubular 305 rotates and advances outside the drilling machine 301 to insure the drilling.

[0074] In a first alternative embodiment, the drilling of the lateral hole 303 and the constructing of the tubular 305 may be performed semi-synchronously: the wrapping may be performed when the drilling is stopped.

[0075] In a second alternative embodiment, the drilling of the lateral hole 303 and the constructing of the tubular 305 may be two separate operations. The drilling may be performed and a drill string 305a may be constructed downhole. The drill-string 305a is removed from the drilled lateral hole 303; the tubular 305 is subsequently constructed downhole and positioned in the drilled lateral hole 303.

[0076] Another advantage of a downhole construction of the tubular 305 according to the invention is the compactness of the drilling machine 301. The storage roll 316 is much shorter than the finished tubular 305. Hence the drilling machine 301 is relatively easy to handle inside the main well. The handling may be directly performed above a wellhead (not represented) as for a production logging.

[0077] The constructed tubular 305 may have a relatively large diameter in comparison with a diameter of the lateral hole 303. For example, for a diameter of the lateral hole 303 of 6.3 centimeters (2,5 inches), the diameter of the constructed tubular 305 may be 5.6 centimeters (2,2 inches), which renders the tubular 303 quite rigid in bending and torsion. Hence the tubular may have a thin wall thickness, typically less than 1 millimeter.

[0078] The wrapped band of metal 314 is jointed in order to insure a fluid sealing of the tubular by a jointing device 315. The jointing may be

performed by welding. However, the welding has to be performed under the presence of fluids, e.g. drilling mud or completion fluids. The presence of fluid, which may contain particles, is a problem for most welding processes due to a loss of heat. The loss of heat may prohibit to reach locally a fusion point of metal. The particles contained in the fluid and the fluid itself may also pollute the melted metal. Furthermore, the fluid may evaporate due to the extreme temperature near the melted metal and cause perturbations to the welding process.

[0079] In a preferred embodiment, spot welding may be used. The spot welding process starts by pressing the wrapped bands of metal 314 against each other, thus removing the potential fluids. Only a small zone, corresponding to welding spots, is welded.

[0080] A drawback of the spot welding process is that fluid sealing may not be optimal. The fluid sealing may be improved by limiting the distance between the welding spots. Additional sealing may be achieved by the use of seals or sealing agents.

[0081] FIG. 4 illustrates a potential solution for the use of seals. A metal sheet 41 that has two bands of sealing agent (42, 43), e.g. a rubber type material, at each edge is employed. Future spots 44 for welding are located between the two bands of sealing agent (42, 43). After welding, the welded spots hold successive sheets in contact while the rubber bands (42, 43) play the role of sealing.

[0082] FIG. 5A and 5B illustrate an alternative to spot welding. A permanent plastic lip pressing method may be used. A band of metal (52, 53) may be shaped for providing a proper jointing when pressed. The band of metal (52, 53) when stored downhole may already have both edges bend as a U-shape, as represented on the figures. FIG. 5A illustrates a wrapping step; the wrapping is performed with a high overlap. Then, as represented in FIG. 5B, the wrapped sheet is extended axially to engage the corresponding U-shape

edges. The jointing is completed by hard pressing (51) of the lips to force them in solid contact. With adequate care, pressing force and proper material, it is possible to make a sealed joint.

[0083] In the first example embodiment, the rotary drilling is performed in successive steps. This is mainly due to the need to change a position of a tubular holding mechanism. Referring again to FIG. 3, the tubular holding mechanism is performed by slips (not represented) at a tip of the short shaft 313. The short shaft 313 is able to be displaced by a limited length. When the limited length is reached, a new section of the tubular 305 having the limited length is constructed. The short shaft 313 grabs the tubular 305 at the new section and the rotary drilling process may be restarted.

[0084] When the active rolled band of metal 306 is empty, it is removed and one of the storage rolls 316 is brought to replace it. A connection between a new band from the brought storage roll and the active band of metal is required.

[0085] **Completion of the lateral hole**

[0086] FIG. 6 illustrates an example embodiment of the invention at a step in which a lateral hole has been drilled at a proper depth. The drilling of the lateral hole 603 has already been performed: a drilling machine 601 is positioned at a determined depth of a main well 602. A tubular 605 is constructed by wrapping a band of metal 614 from an active rolled band of metal 606. The tubular 605 also serves as drill-string during the drilling of the lateral hole 603 by a drill bit 607. A short shaft 613 terminates the tubular 605 inside the drilling machine 601. The short shaft 613 allows to transmit a rotation force and an axial force to the tubular 605 during the drilling. The short shaft 613 also allows a fluid, e.g. a drilling mud, to circulate along the lateral hole 603 during the drilling.

[0087] When the lateral hole has reached the proper depth, a cutting device 616 shears the band of metal 614 at the intersection of the main well 602 with the lateral hole 603.

[0088] Pumping means, e.g. a pump (not represented on FIG. 6) allows to provide a completion of the lateral hole. A cement fluid may be pumped into an annulus between the tubular 605 and the lateral hole 603 along a determined portion of the tubular. The cementing provides isolation between a reservoir 617 and any other surrounding geological layer.

[0089] The lateral hole 603 comprises a zone of communication 619 with the reservoir 617. The annulus is preferentially filled with cement only along the determined portion of the tubular, thus providing isolation. A communication between the reservoir 617 and the lateral hole 603 is generated: the tubular over the zone of communication 619 may for example be a strippable slotted liner 618 and the zone of communication 619 may not be cemented.

[0090] The strippable slotted liner 618 is constructed similar to the construction used for the tubular 605, by wrapping and jointing a slotted band of metal.

[0091] FIG. 7 illustrates a section of the slotted band of metal. The slotted band of metal 74 when stored may already have both edges 73 bend as a U-shape, so as to provide jointing of the slotted bands.

[0092] The slotted band of metal 74 further comprises a slotted layer 75 and a thin layer 72. The slotted layer has slots 71 that allow the communication between the reservoir and the lateral hole. The slots 71 are covered by the thin layer 72 to insure a sealing during the drilling. The thin layer 72 may be stripped or peeled off when the drilling is finished. The peeling may be performed by pulling on a cable 76 attached to an end of the thin layer 72.

[0093] FIG. 8 illustrates an expanding step. In a hole having a small diameter, it is indeed critical to insure that the diameter of the tubular is as large as possible. A tubular 91 constructed from a wrapped band of metal 82 may be expanded by applying a left-hand torque 83 onto the wrapped band of metal

82. The expanding step requires that a bit drill (not represented) be anchored in the formation. The anchoring may be performed by cementing the drill bit, by applying an high axial force onto the tubular, or by any other mean.

[0094] The left-hand torque 83 has a tendency to open the tubular 91 by cracking a pressed spiral joint 84 of the tubular 81. As the tubular 81 opens, the diameter of the tubular increases.

[0095] Depending on the elasticity of the band of metal 82, the expanded tubular 81 may be stable. However, the expanded tubular 81 may also desire to close inward. In this latter case, it is required to lock each end of the band of metal. Another method is to use a jointing surface that allows a movement in only a single side.

[0096] The tubular may be expanded along the determined portion, while the tubular over the zone of communication may be the strippable slotted liner. This may allow a large flow from the reservoir to the main well.

[0097] In a third alternative embodiment, the strippable slotted liner may also be expanded, so as to insure a large axial flow from the reservoir to the lateral hole. Any other combination of the expanded tubular and of the strippable slotted liner may be considered according to geological properties of the formation and to a desired flow rate.

[0098] **Second example embodiment of the invention**

[0099] FIG. 9 illustrates a second example embodiment of the present invention. A drilling machine 901 is positioned at a determined depth in a main well 902. A lateral hole 903 is drilled using the drilling machine. The lateral hole is cased with a tubular 905 that is constructed from a reserve of material. The reserve of material has a size adapted to be stored within the drilling machine 901. The reserve of material contains at least one storage roll 906. Each storage roll 906 encloses a band of metal 914 following a spiral. The tubular is constructed by wrapping the band of metal 914. The wrapped band of metal 914 is jointed by a jointing device 915 just before leaving the

drilling machine 901. The constructed tubular 905 is positioned in the drilled lateral hole 903 and is used as a drill string at an end of which a drill bit 907 drills the lateral hole 903.

[00100] Unlike the example embodiment illustrated in FIG. 3, the storage rolls 906 stay perpendicular to a longitudinal direction of the main well 902 even when in active mode. This is performed by providing a short shaft 913 that is bent to an angle of 90 degrees corresponding in this example to an angle between the lateral hole 903 and the main well 902. The short shaft 913 locks into the constructed tubular with a locking system (not represented) or a slip system (not represented). The short shaft 913 also transmits an axial force and a rotation force that are respectively generated by a motor 909 and a pushing system 911. The short shaft 913 may be a small diameter tube of high elasticity. The wrapped band of metal 914 follows the short shaft 913 while being bended. A guidance system 915 may be needed to guide the short shaft 913.

[00101] As the storage rolls 906 stay always perpendicular to a longitudinal direction of the main well 902, the storage rolls 906 may have a relatively large diameter, which allows a good usage of the volume of the drilling machine 901. Furthermore, the storage rolls do not require to be moved.

[00102] Third example embodiment of the invention

[00103] FIG. 10 illustrates a third example embodiment of the invention. A lateral hole 1003 departing from a wall of a main well 1002 at a determined depth in a direction substantially perpendicular to a longitudinal direction of the main well 1002 is drilled using a drilling machine 1001. A tubular 1005 is constructed downhole and is positioned in the lateral hole 1003. The tubular 1005 is also used during the drilling. The drilling is performed using a drill bit 1007 located at an end of the positioned tubular 1005.

[00104] The tubular 1005 is constructed by wrapping a band of metal 1014. The band of metal 1014 is stored at a surface location in a storage roll 1006. The

band of metal 1014 is unwrapped from the storage roll 1006 at surface. The band of metal 1014 is brought through the main well 1002 to the determined depth following a long shaft 1013.

[00105] A jointing device 1015 located at an intersection of the main well 1002 and the lateral hole 1003 performs a jointing of the wrapped band of metal 1014. The constructed tubular 1005 is then positioned into the lateral hole 1003.

[00106] The drilling of the lateral hole requires a rotation force and an axial force. The rotation force and the axial force may be generated at the surface, respectively by a motor 1009 and a pushing system 1011. The long shaft 1013 transmits the rotation force and the axial force to the constructed tubular.

[00107] In a first alternative embodiment (not represented), the rotation force and the axial force are generated downhole by a motor and a pushing system inside the drilling machine. A short shaft transmits the rotation force and the axial force to the constructed tubular. The band of metal is stored at the surface and is wrapped around the short shaft before being jointed so as to form the tubular.

[00108] In a second alternative embodiment, the tubular is constructed downhole from an elastic material that is brought through the main well at the determined depth. The constructing requires an hardening step in which the elastic material is hardened to form the tubular.

[00109] **Fourth example embodiment of the invention**

[00110] In a fourth example embodiment of the present invention (not represented), the tubular is constructed from a plurality of short pipes. The plurality of short pipes is stored in the drilling machine when positioned at the determined depth. Typically, the short pipes have a section that may be smaller than a diameter of the drilling machine. Hence a new pipe to be assembled with the already constructed tubular may be aligned with the

constructed tubular. The new pipe may be jointed to the constructed tubular by screwing. In this case, each short pipe is threaded.

- [00111] In a first alternative embodiment, the short pipes comprise matching surfaces which may be blocked into each other. A system with an interlocking mechanism may also be considered.
- [00112] In the fourth example embodiment, a rotation force and an axial force are applied to the pipe that is just jointed to the constructed tubular, by using for example a set of jaws. Hence the assembled short pipes need to avoid any rotation relatively to each other.
- [00113] In a second alternative embodiment, the short pipes are obtained with a cold forming process performed downhole, e.g. by extrusion.
- [00114] In a third alternative embodiment, the short pipes are stored at surface. The short pipes are brought through the main well before being assembled so as to construct the tubular.
- [00115] While the invention has been described with respect to a limited number of embodiments, those skilled in the art, having benefit of this disclosure, will appreciate that other embodiments can be devised which do not depart from the scope of the invention as disclosed herein. Accordingly, the scope of the invention should be limited only by the attached claims.